Exemplars of Reading Text Complexity, Quality, and Range & Sample Performance Tasks Related to Core Standards

Selecting Text Exemplars

The following text samples primarily serve to exemplify the level of complexity and quality that the Standards require all students in a given grade band to engage with. Additionally, they are suggestive of the breadth of texts that students should encounter in the text types required by the Standards. The choices should serve as useful guideposts in helping educators select texts of similar complexity, quality, and range for their own classrooms. They expressly do not represent a partial or complete reading list.

The process of text selection was guided by the following criteria:

- Complexity. Appendix A describes in detail a three-part model of measuring text complexity based on qualitative and quantitative indices of inherent text difficulty balanced with educators' professional judgment in matching readers and texts in light of particular tasks. In selecting texts to serve as exemplars, the work group began by soliciting contributions from teachers, educational leaders, and researchers who have experience working with students in the grades for which the texts have been selected. These contributors were asked to recommend texts that they or their colleagues have used successfully with students in a given grade band. The work group made final selections based in part on whether qualitative and quantitative measures indicated that the recommended texts were of sufficient complexity for the grade band. For those types of texts—particularly poetry and multimedia sources—for which these measures are not as well suited, professional judgment necessarily played a greater role in selection.

- Quality. While it is possible to have high-complexity texts of low inherent quality, the work group solicited only texts of recognized value. From the pool of submissions gathered from outside contributors, the work group selected classic or historically significant texts as well as contemporary works of comparable literary merit, cultural significance, and rich content.

- Range. After identifying texts of appropriate complexity and quality, the work group applied other criteria to ensure that the samples presented in each band represented as broad a range of sufficiently complex, high-quality texts as possible. Among the factors considered were initial publication date, authorship, and subject matter.

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For those exemplar texts not in the public domain, we secured permissions and in some cases employed a conservative interpretation of Fair Use, which allows limited, partial use of copyrighted text for a nonprofit educational purpose as long as that purpose does not impair the rights holder's ability to seek a fair return for his or her work. In instances where we could not employ Fair Use and have been unable to secure permission, we have listed a title without providing an excerpt. Thus, some short texts are not excerpted here, as even short passages from them would constitute a substantial portion of the entire work. In addition, illustrations and other graphics in texts are generally not reproduced here. Such visual elements are particularly important in texts for the youngest students and in many informational texts for readers of all ages. (Using the qualitative criteria outlined in Appendix A, the work group considered the importance and complexity of graphical elements when placing texts in bands.)

When excerpts appear, they serve only as stand-ins for the full text. The Standards require that students engage with appropriately complex literary and informational works; such complexity is best found in whole texts rather than passages from such texts.

Please note that these texts are included solely as exemplars in support of the Standards. Any additional use of those texts that are not in the public domain, such as for classroom use or curriculum development, requires independent permission from the rights holders. The texts may not be copied or distributed in any way other than as part of the overall Common Core State Standards Initiative documents.

Sample Performance Tasks

The text exemplars are supplemented by brief performance tasks that further clarify the meaning of the Standards. These sample tasks illustrate specifically the application of the Standards to texts of sufficient complexity, quality, and range. Relevant Reading standards are noted in brackets following each task, and the words in italics in the task reflect the wording of the Reading standard itself. (Individual grade-specific Reading standards are identified by their strand, grade, and number, so that RI.4.3, for example, stands for Reading, Informational Text, grade 4, standard 3.)

How to Read This Document

The materials that follow are divided into text complexity grade bands as defined by the Standards: K–1, 2–3, 4–5, 6–8, 9–10, and 11–CCR. Each band's exemplars are divided into text types matching those required in the Standards for a given grade. K-5 exemplars are separated into stories, poetry, and informational texts (as well as read-aloud texts in kindergarten through grade 3). The 6-CCR exemplars are divided into English language arts (ELA), history/social studies, and science, mathematics, and technical subjects, with the ELA texts further subdivided into stories, drama, poetry, and informational texts. (The history/social studies texts also include some arts-related texts.) Citations introduce each excerpt, and additional citations are included for texts not excerpted in the appendix. Within each grade band and after each text type, sample performance tasks are included for select texts.

Media Texts

Selected excerpts are accompanied by annotated links to related media texts freely available online at the time of the publication of this document.

and one day a half century ago, the black citizens in Montgomery rose up in protest and united to demand their rights—by walking peacefully.

It all started on a bus.

Informational Texts: Science, Mathematics, and Technical Subjects

Macaulay, David. Cathedral: *The Story of Its Construction.* Boston: Houghton Mifflin, 1973. (1973)
From pages 51–56

In order to construct the vaulted ceiling a wooden scaffold was erected connecting the two walls of the choir one hundred and thirty feet above ground. On the scaffolding wooden centerings like those used for the flying buttresses were installed. They would support the arched stone ribs until the mortar was dry, at which times the ribs could support themselves. The ribs carried the webbing, which was the ceiling itself. The vaults were constructed one bay at a time, a bay being the rectangular area between four piers.

One by one, the cut stones of the ribs, called voussoirs, were hoisted onto the centering and mortared into place by the masons. Finally the keystone was lowered into place to lock the ribs together at the crown, the highest point of the arch.

The carpenters then installed pieces of wood, called lagging, that spanned the space between two centerings. On top of the lagging the masons laid one course or layer of webbing stones. The lagging supported the course of webbing until the mortar was dry. The webbing was constructed of the lightest possible stone to lessen the weight on the ribs. Two teams, each with a mason and a carpenter, worked simultaneously from both sides of the vault – installing first the lagging, then the webbing. When they met in the center the vault was complete. The vaulting over the aisle was constructed in the same way and at the same time.

When the mortar in the webbing had set, a four-inch layer of concrete was poured over the entire vault to prevent any cracking between the stones. Once the concrete had set, the lagging was removed and the centering was lowered and moved onto the scaffolding of the next bay. The procedure was repeated until eventually the entire choir was vaulted.

Mackay, Donald. *The Building of Manhattan.* New York: Harper & Row, 1987. (1987)

Media Text
Manhattan on the Web: History, a Web portal hosted by the New York Public Library: http://legacy.www.nypl.org/branch/manhattan/index2.cfm?Trg=1&d1=865

Enzensberger, Hans Magnus. *The Number Devil: A Mathematical Adventure.* Illustrated by Rotraut Susanne Berner. Translated by Michael Henry Heim. New York: Henry Holt, 1998. (1998)
From "The First Night"

. . . "I see," said the number devil with a wry smile. "I have nothing against your Mr. Bockel, but that kind of problem has nothing whatever to do with what I'm interested in. Do you want to know something? Most genuine mathematicians are bad at sums. Besides, they have no time to waste on them. That's what pocket calculators are for. I assume you have one.

"Sure, but we're not allowed to use them in school."

"I see," said the number devil. "That's all right. There's nothing wrong with a little addition and subtraction. You never know when your battery will die on you. But mathematics, my boy, that's something else again!" . . .

. . . "The thing that makes numbers so devilish is precisely that they are simple. And you don't need a calculator to prove it. You need one thing and one thing only: one. With one—I am speaking of the numeral of course—you can do almost anything. If you are afraid of large numbers—let's say five million seven hundred and twenty-three thousand eight hundred and twelve—all you have to do is start with

1 + 1
1+1+1
1+1+1+1
1+1+1+1+1

. . . and go on until you come to five million etcetera. You can't tell me that's too complicated for you, can you?

Peterson, Ivars and Nancy Henderson. *Math Trek: Adventures in the Math Zone*. San Francisco: Jossey-Bass, 2000. (2000)
From "Trek 7, The Fractal Pond Race"

From the meanderings of a pond's edge to the branching of trees and the intricate forms of snowflakes, shapes in nature are often more complicated than geometrical shapes such as circles, spheres, angles, cones, rectangles, and cubes. Benoit Mandelbrot, a mathematics professor at Yale University and an IBM fellow, was the first person to recognize how amazingly common this type of structure is in nature. In 1975, he coined the term fractal for shapes that repeat themselves within an object. The word fractal comes from the Latin term for "broken."

In 1904, long before Mandelbrot conceived of fractals, Swedish mathematician Helge von Koch created and intriguing but puzzling curve. It zigzags in such an odd pattern that it seems impossible to start at one point and follow the curve to reach another point.

Like many figures now known to be fractals, Koch's curve is easy to generate by starting with a simple figure and turning it into an increasingly crinkly form.

What to Do

1. Draw an equilateral triangle with each side measuring 9 centimeters. (Remember, each angle of an equilateral triangle measures 60°.)

2. Divide each 9-centimeter side into three parts, each measuring three centimeters. At the middle of each side, add an equilateral triangle one third the size of the original, facing outward. Because each side of the original triangle is 9 centimeters, the new triangles will have 3-centimeter sides. When you examine the outer edge of your diagram you should see a six-pointed star made up of 12 line segments.

3. At the middle of each segment of the star, add a triangle one ninth the side of the original triangle. The new triangles will have sides 1 centimeter in length so divide each 3-centimeter segment into thirds, and use the middle third to form a new triangle.

4. Going one step farther, you create a shape that begins to resemble a snowflake. If you were to continue the process by endlessly adding smaller and smaller triangles to every new side, you would produce the Koch snowflake curve. Between any two points, the snowflake would have an infinite number of zigzags.

Katz, John. Geeks: *How Two Lost Boys Rode the Internet out of Idaho*. New York: Broadway Books, 2001. (2001)

Jesse and Eric lived in a cave-an airless two-bedroom apartment in a dank stucco-and-brick complex on the outskirts of Caldwell. Two doors down, chickens paraded around the street.

The apartment itself was dominated by two computers that sat across from the front door like twin shrines. Everything else-the piles of dirty laundry, the opened Doritos bags, the empty cans of generic soda pop, two ratty old chairs, and a moldering beanbag chair-was dispensable, an afterthought, props.

Jesse's computer was a Pentium 11 300, Asus P2B (Intel BX chipset) motherboard; a Matrix Milleniurn II AGP; 160 MB SDRAM with a 15.5 GB total hard-drive space; a 4X CD-recorder; 24X CD-ROM; a 17-inch Micron monitor. Plus a scanner and printer. A well-thumbed paperback-Katherine Dunn's novel Geek Love-served as his mousepad.

Eric's computer: an AMD K-6 233 with a generic motherboard; an S3 video card, a 15-inch monitor; a 2.5 GB hard drive with 36 MB SDRAM. Jesse wangled the parts for both from work.

They stashed their bikes and then Jesse blasted in through the door, which was always left open since he can never hang on to keys, and went right to his PC, which was always on. He yelled a question to Eric about the new operating system. "We change them like cartons of milk," he explained. At the moment, he had NT 5, NT 4, Work Station, Windows 98, and he and Eric had begun fooling around with Linux, the complex, open-source software system rapidly spreading across the world.

Petroski, Henry. "The Evolution of the Grocery Bag." ***American Scholar*** **72.4 (Autumn 2003). (2003)**

That much-reviled bottleneck known as the American supermarket checkout lane would be an even greater exercise in frustration were it not for several technological advances. The Universal Product Code and the decoding laser scanner, introduced in 1974, tally a shopper's groceries far more quickly and accurately than the old method of inputting each purchase manually into a cash register. But beeping a large order past the scanner would have led only to a faster pileup of cans and boxes down the line, where the bagger works, had it not been for the introduction, more than a century earlier, of an even greater technological masterpiece: the square-bottomed paper bag.

The geometry of paper bags continues to hold a magical appeal for those of us who are fascinated by how ordinary things are designed and made. Originally, grocery bags were created on demand by storekeepers, who cut, folded, and pasted sheets of paper, making versatile containers into which purchases could be loaded for carrying home. The first paper bags manufactured commercially are said to have been made in Bristol, England, in the 1840s. In 1852, a "Machine for Making Bags of Paper" was patented in America by Francis Wolle, of Bethlehem, Pennsylvania. According to Wolle's own description of the machine's operation, "pieces of paper of suitable length are given out from a roll of the required width, cut off from the roll and otherwise suitably cut to the required shape, folded, their edges pasted and lapped, and formed into complete and perfect bags." The "perfect bags" produced at the rate of eighteen hundred per hour by Wolle's machine were, of course, not perfect, nor was his machine. The history of design has yet to see the development of a perfect object, though it has seen many satisfactory ones and many substantially improved ones. The concept of comparative improvement is embedded in the paradigm for invention, the better mousetrap. No one is ever likely to lay claim to a "best" mousetrap, for that would preclude the inventor himself from coming up with a still better mousetrap without suffering the embarrassment of having previously declared the search complete. As with the mousetrap, so with the bag.

"Geology." ***U*X*L Encyclopedia of Science.*** **Edited by Rob Nagel. Farmington Hills, Mich.: Gale Cengage Learning, 2007. (2007)**

Geology is the scientific study of Earth. Geologists study the planet—its formation, its internal structure, its materials, its chemical and physical processes, and its history. Mountains, valleys, plains, sea floors, minerals, rocks, fossils, and the processes that create and destroy each of these are all the domain of the geologist. Geology is divided into two broad categories of study: physical geology and historical geology.

Physical geology is concerned with the processes occurring on or below the surface of Earth and the materials on which they operate. These processes include volcanic eruptions, landslides, earthquakes, and floods. Materials include rocks, air, seawater, soils, and sediment. Physical geology further divides into more specific branches, each of which deals with its own part of Earth's materials, landforms, and processes. Mineralogy and petrology investigate the composition and origin of minerals and rocks. Volcanologists study lava, rocks, and gases on live, dormant, and extinct volcanoes. Seismologists use instruments to monitor and predict earthquakes and volcanic eruptions.

Historical geology is concerned with the chronology of events, both physical and biological, that have taken place in Earth's history. Paleontologists study fossils (remains of ancient life) for evidence of the evolution of life on Earth. Fossils not only relate evolution, but also speak of the environment in which the organism lived. Corals in rocks at the top of the Grand Canyon in Arizona, for example, show a shallow sea flooded the area around 290 million years ago. In addition, by determining the ages and types of rocks around the world, geologists piece together continental and oceanic history over the past few billion years. Plate tectonics (the study of the movement of the sections of Earth's crust) adds to Earth's story with details of the changing configuration of the continents and oceans.

"Space Probe." ***Astronomy & Space: From the Big Bang to the Big Crunch.*** **Edited by Phillis Engelbert. Farmington Hills, Mich.: Gale Cengage Learning, 2009. (2009)**

A space probe is an unpiloted spacecraft that leaves Earth's orbit to explore the Moon, planets, asteroids, comets, or other objects in outer space as directed by onboard computers and/or instructions send from Earth. The purpose of such missions is to make scientific observations, such as taking pictures, measuring atmospheric conditions, and collecting soil samples, and to bring or report the data back to Earth.

Numerous space probes have been launched since the former Soviet Union first fired Luna 1 toward the Moon in 1959. Probes have now visited each of the eight planets in the solar system.

In fact, two probes—Voyager 1 and Voyager 2—are approaching the edge of the solar system, for their eventual trip into the interstellar medium. By January 2008 Voyager 1 was about 9.4 billion miles (15.2 billion kilometers) from the Sun and in May 2008 it entered the heliosheath (the boundary where the solar wind is thought to end), which is the area that roughly divides the solar system from interstellar space. Voyager 2 is not quite as far as its sister probe. Voyager 1 is expected to be the first human space probe to leave the solar system. Both Voyager probes are still transmit-

ting signals back to Earth. They are expected to help gather further information as to the true boundary of the solar system.

The earliest probes traveled to the closest extraterrestrial target, the Moon. The former Soviet Union launched a series of Luna probes that provided humans with first pictures of the far side of the Moon. In 1966, Luna 9 made the first successful landing on the Moon and sent back television footage from the Moon's surface.

The National Aeronautics and Space Administration (NASA) initially made several unsuccessful attempts to send a probe to the Moon. Not until 1964 did a Ranger probe reach its mark and send back thousands of pictures. Then, a few months after Luna 9, NASA landed Surveyor on the Moon.

In the meantime, NASA was moving ahead with the first series of planetary probes, called Mariner. Mariner 2 first reached the planet Venus in 1962. Later Mariner spacecrafts flew by Mars in 1964 and 1969, providing detailed images of that planet. In 1971, Mariner 9 became the first spacecraft to orbit Mars. During its year in orbit, Mariner 9's two television cameras transmitted footage of an intense Martian dust storm, as well as images of 90 percent of the planet's surface and the two Martian natural satellites (moons).

Encounters were also made with Mars in 1976 by the U.S. probes Viking 1 and Viking 2. Each Viking spacecraft consisted of both an orbiter and a lander. Viking 1 made the first successful soft landing on Mars on July 20, 1976. Soon after, Viking 2 landed on the opposite side of the planet. The Viking orbiters made reports on the Martian weather and photographed almost the entire surface of the planet.

"Elementary Particles." *New Book of Popular Science.* New York: Scholastic, 2010. (2010)

California Invasive Plant Council. Invasive Plant Inventory. http://www.cal-ipc.org/ip/inventory/index.php. 2006-2010. (2010)

The Inventory categorizes plants as High, Moderate, or Limited, reflecting the level of each species' negative ecological impact in California. Other factors, such as economic impact or difficulty of management, are not included in this assessment. It is important to note that even Limited species are invasive and should be of concern to land managers. Although the impact of each plant varies regionally, its rating represents cumulative impacts statewide. Therefore, a plant whose statewide impacts are categorized as Limited may have more severe impacts in a particular region. Conversely, a plant categorized as having a High cumulative impact across California may have very little impact in some regions.

The Inventory Review Committee, Cal-IPC staff, and volunteers drafted assessments for each plant based on the formal criteria system described below. The committee solicited information from land managers across the state to complement the available literature. Assessments were released for public review before the committee finalized them. The 2006 list includes 39 High species, 65 Moderate species, and 89 Limited species. Additional information, including updated observations, will be added to this website periodically, with revisions tracked and dated.

Definitions

The Inventory categorizes "invasive non-native plants that threaten wildlands" according to the definitions below. Plants were evaluated only if they invade California wildlands with native habitat values. The Inventory does not include plants found solely in areas of human-caused disturbance such as roadsides and cultivated agricultural fields.

- Wildlands are public and private lands that support native ecosystems, including some working landscapes such as grazed rangeland and active timberland.
- Non-native plants are species introduced to California after European contact and as a direct or indirect result of human activity.
- Invasive non-native plants that threaten wildlands are plants that 1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.

Sample Performance Tasks for Informational Texts: History/Social Studies & Science, Mathematics, and Technical Subjects

- Students analyze the governmental structure of the United States and *support* their *analysis* by *citing specific textual evidence* from *primary sources* such as the Preamble and First Amendment of the U.S. Constitution as well as secondary sources such as Linda R. Monk's *Words We Live By: Your Annotated Guide to the Constitution.* [RH.6–8.1]
- Students evaluate Jim Murphy's *The Great Fire* to *identify* which *aspects of* the *text* (e.g., *loaded language* and the *inclusion of particular facts*) *reveal* his purpose; presenting Chicago as a city that was "ready to burn." [RH.6–8.6]
- Students *describe how* Russell Freedman in his book *Freedom Walkers: The Story of the Montgomery Bus Boycott* integrates and *presents information* both *sequentially* and *causally* to explain how the civil rights movement began. [RH.6–8.5]
- Students *integrate* the *quantitative or technical information expressed* in the *text* of David Macaulay's *Cathedral: The Story of Its Construction* with the information conveyed by the *diagrams* and *models* Macaulay *provides*, developing a deeper understanding of Gothic architecture. [RST.6–8.7]
- Students construct a holistic picture of the history of Manhattan by *comparing and contrasting the information gained from* Donald Mackay's *The Building of Manhattan* with the *multimedia sources* available on the "Manhattan on the Web" portal hosted by the New York Public Library (http://legacy.www.nypl.org/branch/manhattan/index2.cfm?Trg=1&d1=865). [RST.6–8.9]
- Students learn about fractal geometry by reading Ivars Peterson and Nancy Henderson's *Math Trek: Adventures in the Math Zone* and then generate their own fractal geometric structure by *following the multistep procedure* for creating a Koch's curve. [RST.6–8.3]

Common Core Text Exemplars
Grades 9-10

<u>Informational Texts: Science, Mathematics, and Technical Subjects</u>

Euclid. Elements. Translated by Richard Fitzpatrick. Austin: Richard Fitzpatrick, 2005. (300 BCE)

Cannon, Annie J. "Classifying the Stars." The Universe of Stars. Edited by Harlow Shapeley and Cecilia H. Payne. Cambridge, Mass.: Harvard Observatory, 1926. (1926)

Bronowski, Jacob, and Millicent Selsam. Biography of an Atom. New York: Harper, 1965. (1965)

Walker, Jearl. "Amusement Park Physics." Roundabout: Readings from the Amateur Scientist in Scientific American. New York: Scientific American, 1985. (1985)

Preston, Richard. The Hot Zone: A Terrifying True Story. New York: Anchor, 1995. (1995)

Devlin, Keith. Life by the Numbers. New York: John Wiley & Sons, 1999. (1999)

Hoose, Phillip. The Race to Save Lord God Bird. New York: Farrar, Straus and Giroux, 2004. (2004)

Hakim, Joy. The Story of Science: Newton at the Center. Washington, D.C.: Smithsonian Books, 2005. (2005)

Nicastro, Nicholas. Circumference: Eratosthenes and the Ancient Quest to Measure the Globe. New York: St. Martin's Press, 2008. (2008)

U.S. Environmental Protection Agency/U.S. Department of Energy. Recommended Levels of Insulation. http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_tabl e 2010. (2010)

created, and to facilitate interaction between more than one performer. Musical notation, like language, has ancient origins, dating back to the Middle East in the third millennium BC. The ancient Greeks appear to have been the first to try to represent variations of musical pitch through the medium of the alphabet, and successive civilizations all over the world attempted to formulate similar systems of recognizable musical notation.

Neumatic notation The earliest surviving Western European notational system was called "neumatic notation"—a system of symbols which attempted to portray the rise and fall of a melodic line. These date back to the 9th century AD, and were associated with the performance of sacred music particularly plainsong—in monastic institutions. Several early manuscript sources contain sacred texts with accompanying notation, although there was no standard system. The first appearance of staff notation, in which pitch was indicated by noteheads on or between lines with a symbol called a clef at the beginning to fix the pitch of one note, was in the 9th century French treatise Musica enchiriadis. At the same time music for instruments (particularly organ and lute) was beginning to be written down in diagrammatic form known as tablature, which indicated the positions of the player's fingers.

Mann, Charles C. *Before Columbus: The Americas of 1491.* New York: Atheneum, 2009. (2009)
From Chapter 2

If you asked modern scientists to name the world's greatest achievements in genetic engineering, you might be surprised by one of their low-tech answers: maize.

Scientists know that maize, called "corn" in the United States, was created more than 6,000 years ago. Although exactly how this well-know plant was invented is still a mystery, they do know where it was invented—in the narrow "waist" of southern Mexico. This jumble of mountains, beaches, wet tropical forests, and dry plains is the most ecologically diverse part of Mesoamerica. Today it is the home of more than a dozen different Indian groups, but the human history of these hills and valleys stretches far into the past.

From Hunting to Gathering to Farming

About 11,500 years ago a group of Paleoindians was living in caves in what is now the Mexican state of Puebla. These people were hunters, but they did not bring down mastodons and mammoths. Those huge species were already extinct. Now and then they even feasted on giant turtles (which were probably a lot easier to catch than the fast-moving deer and rabbits.)

Over the next 2,000 years, though, game animals grew scarce. Maybe the people of the area had been too successful at hunting. Maybe, as the climate grew slowly hotter and drier, the grasslands where the animals lived shrank, and so the animal populations shrank, as well. Perhaps the situation was a combination of these two reasons. Whatever the explanation, hunters of Puebla and the neighboring state of Oaxaca turned to plants for more of their food.

Informational Texts: Science, Mathematics, and Technical Subjects

Euclid. *Elements*. Translated by Richard Fitzpatrick. Austin: Richard Fitzpatrick, 2005. (300 BCE)
From Elements, Book 1

Definitions

1. A point is that of which there is no part.
2. And a line is a length without breadth.
3. And the extremities of a line are points.
4. A straight-line is whatever lies evenly with points upon itself.
5. And a surface is that which has length and breadth alone.
6. And the extremities of a surface are lines.
7. A plane surface is whatever lies evenly with straight-lines upon itself.

8. And a plane angle is the inclination of the lines, when two lines in a plane meet one another, and are not laid down straight-on with respect to one another.

9. And when the lines containing the angle are straight then the angle is called rectilinear.

10. And when a straight-line stood upon (another) straight-line makes adjacent angles (which are) equal to one another, each of the equal angles is a right-angle, and the former straight-line is called perpendicular to that upon which it stands.

11. An obtuse angle is greater than a right-angle.

12. And an acute angle is less than a right-angle.

13. A boundary is that which is the extremity of something.

14. A figure is that which is contained by some boundary or boundaries.

15. A circle is a plane figure contained by a single line [which is called a circumference], (such that) all of the straight-lines radiating towards [the circumference] from a single point lying inside the figure are equal to one another.

16. And the point is called the center of the circle.

17. And a diameter of the circle is any straight-line, being drawn through the center, which is brought to an end in each direction by the circumference of the circle. And any such (straight-line) cuts the circle in half.

18. And a semi-circle is the figure contained by the diameter and the circumference it cuts off. And the center of the semi-circle is the same (point) as the (center of) the circle.

19. Rectilinear figures are those figures contained by straight-lines: trilateral figures being contained by three straight-lines, quadrilateral by four, and multilateral by more than four.

20. And of the trilateral figures: an equilateral triangle is that having three equal sides, an isosceles (triangle) that having only two equal sides, and a scalene (triangle) that having three unequal sides.

21. And further of the trilateral figures: a right-angled triangle is that having a right-angle, an obtuse-angled (triangle) that having an obtuse angle, and an acute-angled (triangle) that having three acute angles.

22. And of the quadrilateral figures: a square is that which is right-angled and equilateral, a rectangle that which is right-angled but not equilateral, a rhombus that which is equilateral but not right-angled, and a rhomboid that having opposite sides and angles equal to one another which is neither right-angled nor equilateral. And let quadrilateral figures besides these be called trapezia.

23. Parallel lines are straight-lines which, being in the same plane, and being produced to infinity in each direction, meet with one another in neither (of these directions).

Postulates

1. Let it have been postulated to draw a straight-line from any point to any point.

2. And to produce a finite straight-line continuously in a straight-line.

3. And to draw a circle with any center and radius.

4. And that all right-angles are equal to one another.

5. And that if a straight-line falling across two (other) straight-lines makes internal angles on the same side (of itself) less than two right-angles, being produced to infinity, the two (other) straight-lines meet on that side (of the original straight-line) that the (internal angles) are less than two right-angles (and do not meet on the other side).

Common Notions

1. Things equal to the same thing are also equal to one another.

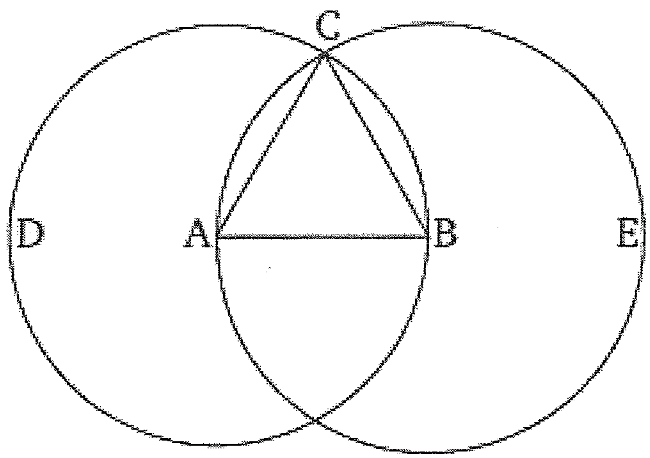
2. And if equal things are added to equal things then the wholes are equal.

3. And if equal things are subtracted from equal things then the remainders are equal.

4. And things coinciding with one another are equal to one another.

5. And the whole [is] greater than the part.

Proposition 1



To construct an equilateral triangle on a given finite straight-line.

Let AB be the given finite straight-line.

So it is required to construct an equilateral triangle on the straight-line AB.

Let the circle BCD with center A and radius AB have been drawn [Post. 3], and again let the circle ACE with center B and radius BA have been drawn [Post. 3]. And let the straight-lines CA and CB have been joined from the point C, where the circles cut one another, to the points A and B (respectively) [Post. 1].

And since the point A is the center of the circle CDB, AC is equal to AB [Def. 1.15]. Again, since the point B is the center of the circle CAE, BC is equal to BA [Def. 1.15]. But CA was also shown to be equal to AB. Thus, CA and CB are each equal to AB. But things equal to the same thing are also equal to one another [C.N.1]. Thus, CA is also equal to CB. Thus, the three (straight-lines) CA, AB, and BC are equal to one another.

Thus, the triangle ABC is equilateral, and has been constructed on the given finite straight-line AB. (Which is) the very thing it was required to do.

Media Text
Translator Robert Fitzpatrick's complete version of Euclid's Elements of Geometry, in bookmarked PDF form, with side-by-side Greek and English text: http://farside.ph.utexas.edu/euclid/Elements.pdf

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Cannon, Annie J. "Classifying the Stars." *The Universe of Stars*. Edited by Harlow Shapeley and Cecilia H. Payne. Cambridge: Harvard Observatory, 1926. (1926)

Sunlight and starlight are composed of waves of various lengths, which the eye, even aided by a telescope, is unable to separate. We must use more than a telescope. In order to sort out the component colors, the light must be dispersed by a prism, or split up by some other means. For instance, sunbeams passing through rain drops, are transformed into the myriad-tinted rainbow. The familiar rainbow spanning the sky is Nature's most glorious demonstration that light is composed of many colors.

The very beginning of our knowledge of the nature of a star dates back to 1672, when Isaac Newton gave to the world the results of his experiments on passing sunlight through a prism. To describe the beautiful band of rainbow tints, produced when sunlight was dispersed by his three-cornered piece of glass, he took from the Latin the word spectrum, meaning an appearance. The rainbow is the spectrum of the Sun.

[...]

In 1814, more than a century after Newton, the spectrum of the Sun was obtained in such purity that an amazing detail was seen and studied by the German optician, Fraunhofer. He saw that the multiple spectral tings, ranging from delicate violet to deep red, were crossed by hundreds of fine dark lines. In other words, there were narrow gaps in the spectrum where certain shades were wholly blotted out.

We must remember that the word spectrum is applied not only to sunlight, but also to the light of any glowing substance when its rays are sorted out by a prism or a grating.

Bronowski, Jacob, and Millicent Selsam. Biography of an Atom. New York: Harper, 1965. (1965)

The birth began in a young star. A young star is a mass of hydrogen nuclei. Because the star is hot (about thirteen million degrees at the center), the nuclei cannot hold on to their electrons. The electrons wander around. The nuclei of hydrogen—that is, the protons—are moving about very fast too. From time to time one proton runs headlong into another. When this happens, one of the protons loses its electric charge and changes into a neutron. The pair then cling together as a single nucleus of heavy hydrogen. This nucleus will in time capture another proton. Now there is a nucleus with two protons and one neutron, called light helium. When two of these nuclei smash into each other, two protons are expelled in the process. This creates a nucleus of helium with two protons and two neutrons.

This is the fundamental process of fusion by which the primitive hydrogen of the universe is built up into a new basic material, helium. In this process, energy is given off in the form of heat and light that make the stars shine. It is the first stage in the birth of the heavier atoms.

Walker, Jearl. "Amusement Park Physics." *Roundabout: Readings from the Amateur Scientist in Scientific American.* New York: Scientific American, 1985. (1985)
From "Amusement Park Physics: Thinking About Physics While Scared to Death (on a Falling Roller Coaster)"

The rides in an amusement park not only are fun but also demonstrate principles of physics. Among them are rotational dynamics and energy conversion. I have been exploring the rides at Geauga Lake Amusement Park near Cleveland and have found that nearly every ride offers a memorable lesson.

To me the scariest rides at the park are the roller coasters. The Big Dipper is similar to many of the roller coasters that have thrilled passengers for most of this century. The cars are pulled by chain t the top of the highest hill along the track, Released from the chain as the front of the car begins its descent, the unpowered cars have almost no speed and only a small acceleration. As more cars get onto the downward slope the acceleration increases. It peaks when all the cars are headed downward. The peak value is the product of the acceleration generated by gravity and the sine of the slope of the track. A steeper descent generates a greater acceleration, but packing the coaster with heavier passengers does not.

When the coaster reaches the bottom of the valley and starts up the next hill, there is an instant when the cars are symmetrically distributed in the valley. The acceleration is zero. As more cars ascend the coaster begins to slow, reaching its lowest speed just as it is symmetrically positioned at the top of the hill.

A roller coaster functions by means of transfers of energy. When the chain hauls the cars to the top of the first hill, it does work on the cars, endowing them with gravitational potential energy, the energy of a body in a gravitational field with respect to the distance of the body from some reference level such as the ground. As the cars descend into the first valley, much of the stored energy is transferred into kinetic energy, the energy of motion.

Preston, Richard. *The Hot Zone: A Terrifying True Story.* New York: Anchor, 1995. (1995)
From "Something in the Forest"

1980 New Year's Day

Charles Monet was a loner. He was a Frenchman who live by himself in a little wooden bungalow on the private lands of the Nzoia Sugar Factory, a plantation in western Kenya that spread along the Nzoiz Rover within sight of Mount Elgon, a huge, solitary, extinct volcano that rises to a height of fourteen thousand feet near the edge of the Rift Valley. Monet's history is a little obscure. As with so many expatriates who end up in Africa, it is not clear what brought him there. Perhaps he had been in some kind of trouble in France. Or perhaps he had been drawn to Kenya by the beauty of the country. He was an amateur naturalist, fond of birds and animals but not of humanity in general. He was fifty-six years old, of medium height and medium build with smooth, straight brown hair; a good-looking man. It seems that his only close friends were women who lived in towns around the mountain, yet even they could not recall much about him for the doctors who investigated his death. His job was to take care of the sugar factory's water-pumping machinery, which drew water from the Nzoia River and delivered it to many miles of sugar-cane fields. They say that

he spent most of his day inside the pump house by the river as if it pleased him to watch and listen to the machines doing their work.

Devlin, Keith. *Life by the Numbers.* New York: John Wiley & Sons, 1999. (1999)
From Chapter 3: "Patterns of Nature"

Though animals come in many shapes and sizes, there are definite limits on the possible size of an animal of a particular shape. King Kong simply could not exist, for instance. As Labarbara has calculated, if you were to take a gorilla and blow it up to the size of King Kong, its weight would increase by more than 14,000 times but the size of its bones would increase by only a few hundred times. Kong's bones would simply not be able to support his body. He would collapse under his own weight!

And the same is true for all those giant locusts, giant ants, and the like. Imagining giants—giant people, giant animals, or giant insects—might prove the basis for an entertaining story, but the rules of science say that giants could not happen. You can't have a giant anything. If you want to change size, you have to change to overall design.

The reason is quite simple. Suppose you double the height (or length) of any creature, say, a gorilla. The weight will increase 8 times (i.e., 2 cubed), but the cross section of the bones will increase only fourfold (2 squared). Or, if you increase the height of the gorilla 10 times, the weight will increase, 1,000 times (10 cubed), but the cross-sectional area of the bones will increase only 100 times (10 squared). In general, when you increase the height by a certain factor, the weight will increase by the cube of that factor but the cross section of the bone will increase only by the square of that factor.

Hoose, Phillip. *The Race to Save Lord God Bird.* New York: Farrar, Straus and Giroux, 2004. (2004)

Hakim, Joy. *The Story of Science: Newton at the Center.* Washington, D.C.: Smithsonian Books, 2005. (2005)

Probability, a branch of mathematics, began with gambling. Pierre de Fermat (of the famous Last Theorem), Blaise Pascal, and the Bernoullis wanted to know the mathematical odds of winning at the card table. Probability didn't tell them for certain that they would or wouldn't draw an ace; it just told them how likely it was. A deck of 52 cards has 4 aces, so the odds of the first drawn card being an ace are 4 in 52 (or 1in 13).

If 20 cards have been played and not an ace among them, those odds improve to 4 in 32 (1in 8). Always keep in mind that probability is about the likelihood of outcomes, not the certainty. If there are only 4 cards left in the deck, and no aces have been played, you can predict with certainty that the next card will be an ace—but you're not using probability; you're using fact. Probability is central to the physics that deals with the complex world inside atoms. We can't determine the action of an individual particle, but with a large number of atoms, predictions based on probability become very accurate.

Nicastro, Nicholas. *Circumference: Eratosthenes and the Ancient Quest to Measure the Globe.* New York: St. Martin's Press, 2008. (2008)
From "The Astrolabe"

The astrolabe (in Greek, "star reckoner") is a manual computing and observation device with myriad uses in astronomy, time keeping, surveying, navigation, and astrology. The principles behind the most common variety, the planispheric astrolabe, were first laid down in antiquity by the Greeks, who pioneered the notion of projecting three-dimensional images on flat surfaces. The device reached a high degree of refinement in the medieval Islamic world, where it was invaluable for determining prayer times and the direction of Mecca from anywhere in the Muslim world. The astrolabe was introduced to Europe by the eleventh century, where is saw wide use until the Renaissance.

The fundamental innovation underlying the astrolabe was the projection of an image of the sky (usually the northern hemisphere, centered on Polaris) on a plane corresponding to the earth's equator. This image, which was typically etched on a brass plate, was inserted into a round frame (the mater) whose circumference was marked in degrees or hours. Over the plate was fitted a lattice-work disk, the rete, with pointers to indicate the positions of major stars. A metal hand, similar to those on a clock, was hinged with the rete at the center of the instrument, as was a sighting vane (the alidade) for determining the angular height of the stars or other features, such as mountaintops. The entire device was usually not more than six to eight inches in diameter and half an inch thick.

One common use of the astrolabe was to determine the time of day, even after dark.

Other uses included determination of sunrise, and sunset times for any date past or future, predicting eclipses, finding important stars or constellations, and measuring the height of earthbound objects and the circumference of the earth. For this and other reasons, the astrolabe has been called "the world's first personal computer."

U.S. Environmental Protection Agency/U.S. Department of Energy. Recommended Levels of Insulation. http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_table **2010. (2010)**

Recommended Levels of Insulation

Insulation level are specified by R-Value. R-Value is a measure of insulation's ability to resist heat traveling through it. The higher the R-Value the better the thermal per

Zone	Add Insulation to Attic		Floor
	Uninsulated Attic	Existing 3–4 Inches of Insulation	
1	R30 to R49	R25 to R30	R13
2	R30 to R60	R25 to R38	R13 to R19
3	R30 to R60	R25 to R38	R19 to R25
4	R38 to R60	R38	R25 to R30
5 to 8	R49 to R60	R38 to R49	R25 to R30

Wall Insulation: Whenever exterior siding is removed on an

Uninsulated wood-frame wall:

- Drill holes in the sheathing and blow insulation into the empty wall cavity before installing the new siding, and
- Zones 3–4: Add R5 insulative wall sheathing beneath the new siding
- Zones 5–8: Add R5 to R6 insulative wall sheathing beneath the new siding.
-

Insulated wood-frame wall:

- For Zones 4 to 8: Add R5 insulative sheathing before installing the new siding.

Sample Performance Tasks for Informational Texts: History/Social Studies & Science, Mathematics, and Technical Subjects

- Students *compare the* similarities and differences in *point of view* in works by Dee Brown and Evan Connell regarding the Battle of Little Bighorn, analyzing *how* the authors *treat the same* event and *which details they include and emphasize in their respective accounts*. [RH.9–10.6]
- Students analyze the role of African American soldiers in the Civil War by *comparing and contrasting primary source* materials against *secondary* syntheses such as Jim Haskins's *Black, Blue and Gray: African Americans in the Civil War*. [RH.9–10.9]
- Students *determine the meaning of words* such as *quadrant, astrolabe, equator*, and *horizon line* in Joan Dash's *The Longitude Prize* as well as *phrases* such as *dead reckoning* and *sailing the parallel* that reflect *social aspects of history*. [RH.9–10.4]
- Students *cite specific textual evidence* from Annie J. Cannon's "Classifying the Stars" *to support* their *analysis of* the scientific importance of the discovery that light is composed of many colors. Students *include* in their *analysis precise details* from the text (such as Cannon's repeated use of the image of the rainbow) to buttress their explanation. [RST.9–10.1].
- Students *determine how* Jearl Walker clarifies the *phenomenon* of acceleration in his essay "Amusement Park Physics," *accurately summarizing* his *conclusions* regarding the physics of roller coasters *and tracing* how *sup-*

porting details regarding the *processes* of rotational dynamics and energy conversion are incorporated in his explanation. [RST.9–10.2]

- Students read in Phillip Hoose's Race to Save Lord God Bird about the attempts scientists and bird-lovers made to save the ivory-billed woodpecker from extinction and *assess the extent to which the reasoning and evidence* Hoose presents *supports* his *scientific* analysis of why protecting this particular species was so challenging. [RST.9–10.8]

Common Core Text Exemplars
Grades 11/12

Informational Texts: Science, Mathematics, and Technical Subjects

Paulos, John Allen. Innumeracy: Mathematical Illiteracy and Its Consequences. New York: Vintage, 1988. (1988)

Gladwell, Malcolm. The Tipping Point: How Little Things Can Make a Big Difference. New York: Back Bay Books, 2002. (2002)

Tyson, Neil deGrasse. "Gravity in Reverse: The Tale of Albert Einstein's 'Greatest Blunder.'" Natural History. 112.10 (Dec 2003). (2003)

Calishain, Tara, and Rael Dornfest. Google Hacks: Tips & Tools for Smarter Searching, 2nd Edition. Sebastopol, Calif.: O'Reilly Media, 2004. (2004)

Kane, Gordon. "The Mysteries of Mass." Scientific American Special Edition December 2005. (2005)

Fischetti, Mark. "Working Knowledge: Electronic Stability Control." Scientific American April 2007. (2007)

U.S. General Services Administration. Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management. http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentType=GSA_BASIC&contentId=22395 2010 (2007)

Kurzweil, Ray. "The Coming Merger of Mind and Machine." Scientific American Special Edition January 2008. (2008)

Gibbs, W. Wayt. "Untangling the Roots of Cancer." Scientific American Special Edition June 2008. (2008)

Gawande, Atul. "The Cost Conundrum: Health Care Costs in McAllen, Texas." The New Yorker June 1, 2009. (2009)

Informational Texts: Science, Mathematics, and Technical Subjects

Paulos, John Allen. ***Innumeracy: Mathematical Illiteracy and Its Consequences.*** **New York: Vintage, 1988. (1988)**
From Chapter 1, "Examples and Principles"

Archimedes and Practically Infinite Numbers

There is a fundamental property of numbers named after the Greek mathematician Archimedes which states that any number, no matter how huge, can be exceeded by adding together sufficiently many of any smaller number, no matter how tiny. Though obvious in principle, the consequences are sometimes resisted, as they were by the student of mine who maintained that human hair just didn't grow in miles per hour. Unfortunately, the nanoseconds used up in a simple computer operation do add up to lengthy bottlenecks on intractable problems, many of which would require millennia to solve in general. It takes some getting accustomed to the fact that the minuscule times and distances of microphysics as well as the vastness of astronomical phenomena share the dimensions of our human world.

It's clear how the above property of numbers led to Archimedes' famous pronouncement that given a fulcrum, a long enough lever, and a place to stand, he alone could physically lift the earth. An awareness of the additivity of small quantities is lacking in innumerates, who don't seem to believe that their little aerosol cans of hairspray could play any role in the depletion of the ozone layer of the atmosphere, or that their individual automobile contributes anything to the problem of acid rain.

Gladwell, Malcolm. ***The Tipping Point: How Little Things Can Make a Big Difference.*** **New York: Back Bay Books, 2002. (2002)**
From "The Three Rules of Epidemics"

The three rules of the Tipping Point—the Law of the few, the Stickiness Factor, the Power of Context—offer a way of making sense of epidemics. They provide us with direction for how to go about reaching a Tipping Point. The balance of this book will take these ideas and apply them to other puzzling situations and epidemics from the world around us. How do these three rules help us understand teenage smoking, for example, or the phenomenon of word of mouth, or crime, or the rise of a bestseller? The answers may surprise you.

Tyson, Neil deGrasse. "Gravity in Reverse: The Tale of Albert Einstein's 'Greatest Blunder.'" ***Natural History.*** **112.10 (Dec 2003). (2003)**

Sung to the tune of "The Times They Are A-Changin'":

Come gather 'round, math phobes,
Wherever you roam
And admit that the cosmos
Around you has grown
And accept it that soon
You won't know what's worth knowin'
Until Einstein to you
Becomes clearer.
So you'd better start listenin'
Or you'll drift cold and lone
For the cosmos is weird, gettin' weirder.
—The Editors (with apologies to Bob Dylan)

Cosmology has always been weird. Worlds resting on the backs of turtles, matter and energy coming into existence out of much less than thin air. And now, just when you'd gotten familiar, if hot really comfortable, with the idea of a big bang, along comes something new to worry about. A mysterious and universal pressure pervades all of space and acts against the cosmic gravity that has tried to drag the universe back together ever since the big bang. On top of that, "negative gravity" has forced the expansion of the universe to accelerate exponentially, and cosmic gravity is losing the tug-of-war.

For these and similarly mind-warping ideas in twentieth-century physics, just blame Albert Einstein.

Einstein hardly ever set foot in the laboratory; he didn't test phenomena or use elaborate equipment. He was a theorist who perfected the "thought experiment," in which you engage nature through your imagination, inventing a situation or a model and then working out the consequences of some physical principle.

If—as was the case for Einstein—a physicist's model is intended to represent the entire universe, then manipulating the model should be tantamount to manipulating the universe itself. Observers and experimentalists can then go out and look for the phenomena predicted by that model. If the model is flawed, or if the theorists make a mistake in their

calculations, the observers will detect a mismatch between the model's predictions and the way things happen in the real universe. That's the first cue to try again, either by adjusting the old model or by creating a new one.

Media Text
NOVA animation of an Einstein "thought experiment": http://www.pbs.org/wgbh/nova/einstein/relativity/

Calishain, Tara, and Rael Dornfest. *Google Hacks: Tips & Tools for Smarter Searching, 2nd Edition.* Sebastopol, Calif.: O'Reilly Media, 2004. (2004)
From Chapter 1, "Web: Hacks 1-20" Google Web Search Basics

Whenever you search for more than one keyword at a time, a search engine has a default strategy for handling and combining those keywords. Can those words appear individually in a page, or do they have to be right next to each other? Will the engine search for both keywords or for either keyword?

Phrase Searches

Google defaults to searching for occurrences of your specified keywords anywhere on the page, whether side-by-side or scattered throughout. To return results of pages containing specifically ordered words, enclose them in quotes, turning your keyword search into a phrase search, to use Google's terminology.

On entering a search for the keywords:

> to be or not to be

Google will find matches where the keywords appear anywhere on the page. If you want Google to find you matches where the keywords appear together as a phrase, surround them with quotes, like this:

> "to be or not to be"

Google will return matches only where those words appear together (not to mention explicitly including stop words such as "to" and "or" [...]).

Phrase searches are also useful when you want to find a phrase but aren't sure of the exact wording. This is accomplished in combination with wildcards [...])

Basic Boolean

Whether an engine searches for all keywords or any of them depends on what is called its Boolean default. Search engines can default to Boolean AND (searching for all keywords) or Boolean OR (searching for any keywords). Of course, even if a search engine defaults to searching for all keywords, you can usually give it a special command to instruct it to search for any keyword. Lacking specific instructions, the engine falls back on its default setting.

Google's Boolean default is AND, which means that, if you enter query words without modifiers, Google will search or all of your query words. For example if you search for:

> snowblower Honda "Green Bay"

Google will search for all the words. If you prefer to specify that any one word or phrase is acceptable, put an OR between each:

> snowblower OR Honda OR "Green Bay"

Kane, Gordon. "The Mysteries of Mass." *Scientific American Special Edition* December 2005. (2005)

Physicists are hunting for an elusive particle that would reveal the presence of a new kind of field that permeates all of reality. Finding that Higgs field will give us a more complete understanding about how the universe works.

Most people think they know what mass is, but they understand only part of the story. For instance, an elephant is clearly bulkier and weighs more than an ant. Even in the absence of gravity, the elephant would have greater mass—it would be harder to push and set in motion. Obviously the elephant is more massive because it is made of many more atoms than the ant is, but what determines the masses of the individual atoms? What about the elementary particles that make up the atoms—what determines their masses? Indeed, why do they even have mass?

We see that the problem of mass has two independent aspects. First, we need to learn how mass arises at all. It turns out mass results from at least three different mechanisms, which I will describe below. A key player in physicists'

tentative theories about mass is a new kind of field that permeates all of reality, called the Higgs field. Elementary particle masses are thought to come about from the interaction with the Higgs field. If the Higgs field exists, theory demands that it have an associated particle, the Higgs boson. Using particle accelerators, scientists are now hunting for the Higgs.

Fischetti, Mark. "Working Knowledge: Electronic Stability Control." ***Scientific American*** **April 2007. (2007)**

Steer Clear

Automakers are offering electronic stability control on more and more passenger vehicles to help prevent them from sliding, veering off the road, or even rolling over. The technology is a product of an ongoing evolution stemming from antilock brakes.

When a driver jams the brake pedal too hard, anti-lock hydraulic valves subtract brake pressure at a given wheel so the wheel does not lock up. As these systems proliferated in the 1990s, manufacturers tacked on traction-control valves that help a spinning drive wheel grip the road.

For stability control, engineers mounted more hydraulics that can apply pressure to any wheel, even if the driver is not braking. When sensors indicate the car is sliding forward instead of turning or is turning too sharply, the actuators momentarily brake certain wheels to correct the trajectory. "Going to electronic stability control was a big step," says Scott Dahl, director of chassis-control strategy at supplier Robert Bosch in Farmington Hills, Michigan. "We had to add sensors that can determine what the driver intends to do and compare that with what the car is actually doing." Most systems also petition the engine-control computer to reduce engine torque to dampen wayward movement.

U.S. General Services Administration. Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management. http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentType=GSA_BASIC&contentId=22395 2010 (2007)

Executive Order 13423

Strengthening Federal Environmental, Energy, and Transportation Management

The President Strengthening Federal Environmental, Energy, and Transportation Management
By the authority vested in me as President by the Constitution and the laws of the United States of America, and to strengthen the environmental, energy, and transportation management of Federal agencies, it is hereby ordered as follows:

Section 1. Policy. It is the policy of the United States that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

Sec. 2. Goals for Agencies. In implementing the policy set forth in section 1 of this order, the head of each agency shall:

(a) improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003;

(b) ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use;

(c) beginning in FY 2008, reduce water consumption intensity, relative to the baseline of the agency's water consumption in fiscal year 2007, through life-cycle cost-effective measures by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015;

(d) require in agency acquisitions of goods and services (i) use of sustainable environmental practices, including acquisition of biobased, environmentally preferable, energy-efficient, water-efficient, and recycled-content products, and (ii) use of paper of at least 30 percent post-consumer fiber content;

(e) ensure that the agency (i) reduces the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency, (ii) increases diversion of solid waste as appropriate, and (iii) maintains cost-effective waste prevention and recycling programs in its facilities;

(f) ensure that (i) new construction and major renovation of agency buildings comply with the Guiding Principles for

Federal Leadership in High Performance and Sustainable Buildings set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006), and (ii) 15 percent of the existing Federal capital asset building inventory of the agency as of the end of fiscal year 2015 incorporates the sustainable practices in the Guiding Principles;

(g) ensure that, if the agency operates a fleet of at least 20 motor vehicles, the agency, relative to agency baselines for fiscal year 2005, (i) reduces the fleet's total consumption of petroleum products by 2 percent annually through the end of fiscal year 2015, (ii) increases the total fuel consumption that is non-petroleum-based by 10 percent annually, and (iii) uses plug-in hybrid (PIH) vehicles when PIH vehicles are commercially available at a cost reasonably comparable, on the basis of life-cycle cost, to non-PIH vehicles; and

(h) ensure that the agency (i) when acquiring an electronic product to meet its requirements, meets at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product,

(ii) enables the Energy Star feature on agency computers and monitors,

(iii) establishes and implements policies to extend the useful life of agency electronic equipment, and (iv) uses environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.

Kurzweil, Ray. "The Coming Merger of Mind and Machine." *Scientific American Special Edition* January 2008. (2008)

The accelerating pace of technological progress means that our intelligent creations will soon eclipse us—and that their creations will eventually eclipse them.

Sometime early in this century the intelligence of machines will exceed that of humans. Within a quarter of a century, machines will exhibit the full range of human intellect, emotions and skills, ranging from musical and other creative aptitudes to physical movement. They will claim to have feelings and, unlike today's virtual personalities, will be very convincing when they tell us so. By around 2020 a $1,000 computer will at least match the processing power of the human brain. By 2029 the software for intelligence will have been largely mastered, and the average personal computer will be equivalent to 1,000 brains.

Once computers achieve a level of intelligence comparable to that of humans, they will necessarily soar past it. For example, if I learn French, I can't readily download that learning to you. The reason is that for us, learning involves successions of stunningly complex patterns of interconnections among brain cells (neurons) and among the concentrations of biochemicals known as neurotransmitters that enable impulses to travel from neuron to neuron. We have no way of quickly downloading these patterns. But quick downloading will allow our nonbiological creations to share immediately what they learn with billions of other machines. Ultimately, nonbiological entities will master not only the sum total of their own knowledge but all of ours as well.

Gibbs, W. Wayt. "Untangling the Roots of Cancer." *Scientific American Special Edition* June 2008. (2008)

Recent evidence challenges long-held theories of how cells turn malignant—and suggests new ways to stop tumors before they spread.

What causes cancer?

Tobacco smoke, most people would say. Probably too much alcohol, sunshine or grilled meat; infection with cervical papillomaviruses; asbestos. All have strong links to cancer, certainly. But they cannot be root causes. Much of the population is exposed to these carcinogens, yet only a tiny minority suffers dangerous tumors as a consequence.

A cause, by definition, leads invariably to its effect. The immediate cause of cancer must be some combination of insults and accidents that induces normal cells in a healthy human body to turn malignant, growing like weeds and sprouting in unnatural places.

At this level, the cause of cancer is not entirely a mystery. In fact, a decade ago many geneticists were confident that science was homing in on a final answer: cancer is the result of cumulative mutations that alter specific locations in a cell's DNA and thus change the particular proteins encoded by cancer-related genes at those spots. The mutations affect two kinds of cancer genes. The first are called tumor suppressors. They normally restrain cells' ability to divide, and mutations permanently disable the genes. The second variety, known as oncogenes, stimulate growth—in other words, cell division. Mutations lock oncogenes into an active state. Some researchers still take it as axiomatic that such growth-promoting changes to a small number of cancer genes are the initial event and root cause of every human cancer.

Gawande, Atul. "The Cost Conundrum: Health Care Costs in McAllen, Texas." ***The New Yorker*** **June 1, 2009. (2009)**

It is spring in McAllen, Texas. The morning sun is warm. The streets are lined with palm trees and pickup trucks. McAllen is in Hidalgo County, which has the lowest household income in the country, but it's a border town, and a thriving foreign-trade zone has kept the unemployment rate below ten per cent. McAllen calls itself the Square Dance Capital of the World. "Lonesome Dove" was set around here.

McAllen has another distinction, too: it is one of the most expensive health-care markets in the country. Only Miami—which has much higher labor and living costs—spends more per person on health care. In 2006, Medicare spent fifteen thousand dollars per enrollee here, almost twice the national average. The income per capita is twelve thousand dollars. In other words, Medicare spends three thousand dollars more per person here than the average person earns.

The explosive trend in American medical costs seems to have occurred here in an especially intense form. Our country's health care is by far the most expensive in the world. In Washington, the aim of health-care reform is not just to extend medical coverage to everybody but also to bring costs under control. Spending on doctors, hospitals, drugs, and the like now consumes more than one of every six dollars we earn. The financial burden has damaged the global competitiveness of American businesses and bankrupted millions of families, even those with insurance. It's also devouring our government. "The greatest threat to America's fiscal health is not Social Security," President Barack Obama said in a March speech at the White House. "It's not the investments that we've made to rescue our economy during this crisis. By a wide margin, the biggest threat to our nation's balance sheet is the skyrocketing cost of health care. It's not even close."

Sample Performance Tasks for Informational Texts: History/Social Studies & Science, Mathematics, and Technical Subjects

- Students *determine the central ideas* found in the Declaration of Sentiments by the Seneca Falls Conference, noting the parallels between it and the Declaration of Independence and *providing a summary that makes clear the relationships among the key details and ideas* of each text and between the texts. [RH.11–12.2]
- Students *evaluate* the *premises* of James M. McPherson's argument regarding why Northern soldiers fought in the Civil War by *corroborating* the *evidence* provided from the letters and diaries of these soldiers with *other* primary and secondary *sources* and *challenging* McPherson's *claims* where appropriate. [RH.11–12.8]
- Students *integrate* the *information* provided by Mary C. Daly, vice president at the Federal Reserve Bank of San Francisco, with the data presented *visually* in the *FedViews* report. In their analysis of these *sources of information presented in diverse formats*, students frame and *address a question* or *solve a problem* raised by their *evaluation* of the evidence. [RH.11–12.7]
- Students *analyze the hierarchical* relationships between phrase searches and searches that use basic Boolean operators in Tara Calishain and Rael Dornfest's *Google Hacks: Tips & Tools for Smarter Searching, 2nd Edition.* [RST.11–12.5]
- Students *analyze* the concept of mass based on their close reading of Gordon Kane's "The Mysteries of Mass" and *cite specific textual evidence* from the *text* to answer the question of why elementary particles have mass at all. Students explain *important distinctions the author makes* regarding the Higgs field and the Higgs boson and their relationship to the concept of mass. [RST.11–12.1]
- Students *determine the meaning of key terms* such as *hydraulic*, *trajectory*, and *torque* as well as other *domain-specific words and phrases* such as *actuators*, *antilock brakes*, and *traction control used* in Mark Fischetti's "Working Knowledge: Electronic Stability Control." [RST.11–12.4]